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THREE EVALUATIONS - A STAND NEAR WILL VALLEY, FRY CREEK CAMPGROUND, AND PALOMAR FIRE STATION, PALOMAR RANGER DISITRICT, CLEVELAND NATIONAL FOREST

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ABSTRACT

Three sites were visited on the Palomar Ranger District, Cleveland National Forest. A mixed conifer stand in one unit between Will Valley and Dyche Valley was experiencing mortality at its western end. Evidences of annosus root disease, western pine beetle, and red turpentine beetle were found. Management alternatives are presented that address the areas where pests are of concern. These include sanitation/salvage, patch cut and regenerate with oaks, stump treatment, and the no action alternative. Fry Creek Campground was visited and annosus root disease in white fir was discovered. Alternatives for root disease centers include regenerating with other species, thinning, and the no action alternative. Borax stump treatment should be practiced throughout the campground. Declining incense-cedars around Palomar Fire Station were examined. Principal reasons for the decline appear to be abiotic factors related to the maintenance of the facilities and grounds.

INTRODUCTION

On March 6, 1984 we examined three areas on the Palomar Ranger District, Cleveland National Forest for forest pests. Gene Blankenbaker from the District accompanied us. The first two sites we visited, a stand near Will Valley and Fry Creek Campground, will be used by Gene for silvicultural certification purposes. He had noted mortality in part of the stand and suspected annosus root disease might be present. Although he had not observed any pests in the campground, he asked us to look at it while we were on the District. The third site we looked at was the Palomar Fire Station. Declining incense-cedars had caused some concern.

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WILL VALLEY STAND

OBSERVATIONS

The 35-acre stand (T. 10S., R. 2E., sec. 20) is part of a 1977 purchase area. It has been managed principally to meet dispersed recreation and wildlife objectives. It is a mixed conifer stand with Coulter pine, big-cone Douglas-fir, black oak, and canyon live oak. Brush species include manzanita and Ceanothus. Grasses are also abundant.

The west end of the stand was the area of concern. Recently killed Coulter pines were observed that were currently infested by western pine beetles (Dendroctonus brevicomis) and red turpentine beetles (D. valens). Elsewhere in the stand openings containing snags, windthrown trees, and stumps were also observed. Excavation of stumps and roots of dead trees revealed evidence of Fomes annosus. The fungus appeared limited to the pines, but there were very few big-cone Douglas-firs in the immediate vicinity.

MANAGEMENT ALTERNATIVES

1. No Action. Conifer mortality will continue in and around annosus root disease centers as infected trees are attacked by bark beetles. Because of the aggregating pheromones produced by beetles making successful attacks on infested trees, non-infected Coulter pines bordering these root disease centers may be killed. This mortality will accelerate during years of below normal precipitation. Root disease centers will continue to expand and infect healthy trees where root-to-root contacts occur. This will be somewhat limited in this stand because of the large proportion of non-host oaks.

2. Sanitation/Salvage. Periodic entries into the stand would be necessary to remove dead, beetle infested, and declining trees. Removing dead trees will have no effect other than to obtain some value for the wood. It will reduce the number of prospective snags for wildlife. Sanitizing the stand by removing declining trees may increase the value of the wood recovered. It will also reduce the need for more frequent salvage entries. By removing beetle-infested trees and trees that have an increased susceptibility to bark beetle attacks, surrounding healthy trees may have reduced exposure to successful attacks. This may reduce the size of dead tree groups. The number of trees that die from root disease infection and the spread of root disease will not decrease.

3. Patch Cut and Regenerate with Oaks. Root disease centers that are of concern would be identified. The boundaries of these centers, based on above ground symptoms, would be delineated. All conifers within these centers would be removed. In addition, a 75-foot buffer around the boundaries of each center would be cleared of all conifers. This would assure removing at least most of the symptomless infected trees

from the boundaries of the centers. It could also limit further outward spread of the fungus. In those clearings where sufficient oaks do not remain, regeneration of either native species of oak may be necessary.

4. Stump Treatment. The application of borax (sodium tetraborate decahydrate, EPA Reg. No. 1624-94) to freshly cut conifer stumps is effective in limiting new infections of F. annosus. Any activities that include conifer removal in the area should be accompanied by this treatment (see FSM 2305 and 2331.33 R-5 Supplement No. 90).

FRY CREEK CAMPGROUND

OBSERVATIONS

This several acre campground was constructed in 1968. It is heavily used during the seven months of the year that it is open. The vegetation is comprised of an uneven-aged, mixed conifer stand, brush, and grass. Tree species include white fir, big-cone Douglas-fir, Coulter pine, black oak, canyon live oak, and incense-cedar. The principal activity affecting the vegetation, at present, is the pruning or removal of trees considered to be hazardous to the public.

Only two pests were observed in the campground. True mistletoe (Phoradendron villosum ssp. villosum) was lightly scattered in some of the black oaks. None of the trees were infected severely enough to be of concern. The other pest was Fomes annosus. Conks of the fungus were found in white fir stumps in two separate locations. At one of the locations sapling white firs had symptoms of crown decline indicative of annosus root disease.

MANAGEMENT ALTERNATIVES

1. No Action. Occasional mortality of white firs in annosus root disease centers will continue. Mortality will primarily occur in the smaller size classes, although larger infected trees may be windthrown. Following years with below normal precipitation, mortality levels will increase. New infection centers may be created when hazardous white firs are removed if stumps are not treated with borax.

2. Regenerate Centers with Other Species. Root disease centers in white fir can be regenerated with species such as Coulter pine, oaks, and possibly big-cone Douglas-fir and incense-cedar. These species appear to be resistant to, or at least tolerate, infection by F. annosus that originates in white fir. In addition to revegetating openings, in time, as these trees grow and occupy the site, the establishment of less susceptible roots between root systems of susceptible trees may limit the underground spread of the fungus in a center.

3. Thin in and around Root Disease Centers. By removing some infected trees and favoring the retention of less susceptible hosts in root disease centers, the effect of the disease will be reduced. In addition, those white firs that remain in the root disease center may respond to release. This could result in their regenerating sufficient roots to compensate for those killed by the disease, thereby prolonging the life of the tree.

4. Stump Treatment. Borax application to freshly cut conifer stumps will reduce the number of new infection centers. Even stumps of dead trees, especially white fir, should be treated after tree falling.

PALOMAR FIRE STATION

The third visit we made was to the Palomar Fire Station. Incense-cedars around the station were declining. One of the trees in the back of the Station was heavily infected by true mistletoe (Phoradendron juniperinum ssp. libocedri). In addition, paving and grading around the tree have probably resulted in root damage and decreased the capabilities of the roots to provide water and nutrients. The trees in the front of the station are at the edge of a lawn which is irrigated when it is dry. In the process, of course, the trees too are watered. This type of off-season watering of native vegetation often upsets their normal balance, resulting in adverse reactions by the plant. Also, a root disease fungus, Armillaria mellea, often attacks tree roots that are stressed by such things as frequent and widely fluctuating moisture patterns. This fungus was not observed on the affected incense-cedars, but close examinations of the roots were not made because of the desire not to disturb or injure them. In situations such as at the fire station where artifical soil moisture, soil nutrient, and perhaps other regimes are impared, it is possible that native vegetation will not grow well unless it is tended very carefully.

BIOLOGY OF PESTS

Annosus Root Disease (Fomes annosus). Infection of conifers by F. annosus begins when airborne spores are deposited on freshly cut stump surfaces, or basal wounds of true firs. After germination, the fungus grows into the stump and root system, decaying the wood. When root contact occurs with roots from surrounding live conifers, the fungus can cross over and begin decaying this new root system. This type of local spread results in the formation of expanding disease centers.

Fomes annosus is not a strong competitor in attacking dead tissue, therefore, it must colonize new stumps and wounds rapidly to be successful. Once established in a stump-root system, however, it may persist as a saprophyte for many years, the length of time depending in part on the mass of woody tissue available to the fungus. After occupying woody tissue it will slowly decay the moist tissue, which can result in the development of cavities in stumps. These cavities function as moist chambers where the leathery, poroid conks develop and produce spores.

Fomes annosus can rapidly kill true fir seedlings and saplings. Larger trees usually decline slowly as roots are decayed. In unsuppressed white firs this decline may involve a reduction in height growth and reduction in needle retention in the upper crown. As the root system decays, the tree may be windthrown or predisposed to attack by fir engravers.

Fomes annosus attacks the cambium and sapwood tissues of pines. The fungus can rapidly grow through this tissue, killing roots as it proceeds. This stress often results in successful attacks by pine bark beetles and wood borers, and subsequent rapid death of the tree. Annosus root disease centers in pine expand outward at an annual average rate of 1 to 2 feet.

Western Pine Beetle (Dendroctonus brevicomis). The western pine beetle is the most damaging bark beetle of Coulter pine in California. If an attack is successful, the adults mate under the bark in the phloem-cambium region of the tree bole. Eggs are laid in sinuous, winding galleries and after a short incubation period, the eggs hatch and the tiny larvae chew their way into the outer bark where they complete their development. The western pine beetle may, depending on environmental conditions, complete three to four generations per year. Almost always, tree killing by the beetles is associated with one or more tree weakening (predisposing) factors, including overcrowding, drought, disturbance, injury (such as road construction, logging damage, campers, fire, or lightning) and tree diseases (such as dwarf mistletoe and root diseases). Some predisposing factors are reversible, for example overcrowding. Others, like root diseases, are irreversible.

In situations where tree killing occurs, all Coulter pine trees in the stand are visited, at random and with equal frequency, by adult western pine beetles. Healthy, vigorous trees may be attacked, but usually, the attacks are unsuccessful. If some trees are unthrifty, that is, they are of low vigor because of some predisposing factor, the initial attacks may be successful. If this happens, the "pioneer" beetles cause the release of an aggregating pheromone and the tree becomes the center of a mass-attack. Depending on the proximity of other Coulter pine trees to this attractant center, additional trees may be killed causing a dead tree group to occur.